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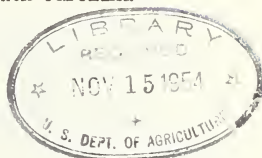
R. J. Haskell

REPORT OF INFORMAL CONFERENCE ON

SWEET POTATO INTERNAL CORK, A PROBABLE VIRUS DISEASE

Edisto Experiment Station, Blackville, South Carolina

September 12, 1946



Attendance

Georgia

University of Georgia, Athens: J. H. Miller, W. C. Carter.
Coastal Plain Experiment Station, Tifton: R. P. Goolsby,
T. J. Ratcliffe.

Maryland

University of Maryland, College Park: R. A. Jehle

Mississippi

Truck Crops Branch Station, Crystal Springs: D. C. Bain

North Carolina

State College, Raleigh: D. E. Ellis, H. R. Garriss

South Carolina

Clemson College, Clemson: R. A. McGinty, G. M. Armstrong,
W. C. Nettles, O. B. Garrison, J. A. Berly, H. A. Bowers
(P.O. Barnwell), T. A. Cole (P.O. Columbia).
Edisto Experiment Station, Blackville: W. B. Rogers, C. J.
Nusbaum, J. G. Watts, M. B. Hughes.
U. S. Vegetable Breeding Laboratory, Charleston: C. F. Andrus

Tennessee

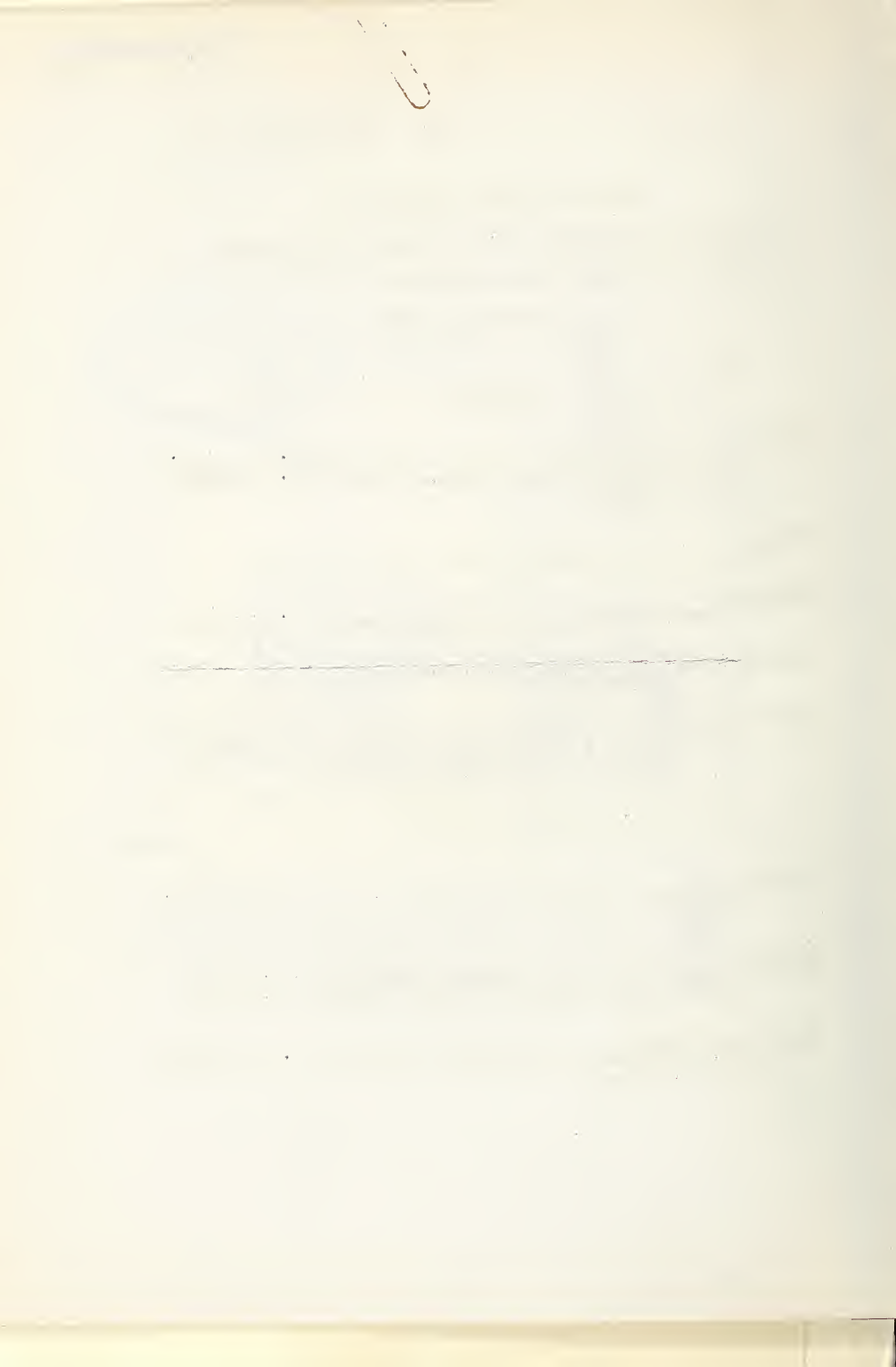
University of Tennessee, Knoxville: C. D. Sherbakoff, J. O.
Andes.

Virginia

Virginia Polytechnic Institute, Blacksburg: S. P. Fenne.
Virginia Truck Experiment Station, Norfolk: H. T. Cook

District of Columbia

U. S. Department of Agriculture, Washington: R. J. Haskell,
Howard P. Barss.



File with report.

Omissions in Sweetpotato Internal Cork Disease Conference
Report

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In the top line after the word "later" the following should be added:

"put various species of insects from sweetpotato fields in the vicinity, including thrips, aphids, tortoise beetles (larvae and adults) and leafhoppers. By September, observation disclosed some foliage symptoms developing in some cages but determination of results would have to await the end of the season. Since the disease had later been found in North"

In the second line of the second paragraph "1946" should be "1945".

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The following should be added to the last paragraph:

"evidence that they were both expressions of the same pathogenic entity had not yet been produced experimentally and that other possibilities must be held in mind although all the evidence now at hand, circumstantial though it was, pointed very strongly to the probability that the disease is of virus origin, very likely insect-transmitted in nature, and capable of producing both the foliage and the internal root symptoms referred to."

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The following should be added to the beginning of the first paragraph:

"Attention was called to the fact that roots affected with internal cork fail to sprout as rapidly or as vigorously as healthy roots and they tend to produce fewer sprouts. Poor sprouting can be largely overcome, Nusbaum stated, etc."

The conference was opened about 10:30 a.m. by R. A. McGinty, Vice Director, South Carolina Agricultural Experiment Station, who welcomed those present. He referred to the potential menace to Southern agriculture created by the presence of the sweetpotato disease known as internal cork and commented on the timeliness of coming together to review present knowledge of the disease and to discuss what might be done about it. He then turned the meeting over to R. J. Haskell, Extension Plant Pathologist, U. S. D. A., who presided.

History and Research Progress on Internal Cork

C. J. Nusbaum described his discovery of the disease in sweetpotatoes from the 1943 harvest at the Edisto Experiment Station, Blackville, S. C. The dark brown to blackish, cork spots, streaks and irregular areas within the flesh were found in the spring of 1944 on cutting some stock from storage. The nature of the disease was unknown. Nothing like it was found referred to in published literature. Microscopic investigation and careful culture work failed to reveal the presence of any microorganism.

A survey in 1944 of various farming areas of South Carolina as well as of sweetpotato dehydrating plants in South Carolina and at Augusta, Georgia, disclosed the presence of the typical internal corky spots in low percentages at every place visited. This disconcerting revelation indicated the need for immediate further study.

The possibility that boron deficiency might be involved, as in the case of cork spot of apples, was definitely eliminated by experiments in 1944 that showed that lack of sufficient boron resulted in an entirely different type of internal and external tissue break-down often accompanied by malformation of the sweetpotatoes.

In the spring of 1944 two bushels of sweetpotatoes that had shown internal cork when cut open were bedded and the sprouts planted in comparison with those from unselected stock. The roots grown from the former showed higher incidence of internal cork than those from the latter indicating the probability that this was a vegetatively perpetuated disorder.

In the summer of 1944 certain leaf symptoms, not previously noted, were observed in the field. Sweetpotato leaves on some plants showed reddish or purplish blotches sometimes occurring in ring form. Roots on these plants usually showed some internal cork spots.

With the thought that it might be a virus disease, it was planned to try transmission experiments but no local sweetpotato stocks grown 1944 were found free from some of the disease. So, in 1945, stocks



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were secured from various States. A supply of Nancy Gold from Elmer in Kansas showed no spots when cut and the plants grown from them showed no leaf symptoms. With these transmission experiments were conducted in the greenhouse.

Using diseased Porto Rico stock as possible source of virus-containing juice, 60 of the disease-free Nancy Gold plants were inoculated by rubbing the leaves with juice from the Porto Rico plants. No leaf symptoms resulted after 80 days. Likewise no results were obtained by using the needle-puncture inoculation method. However, when healthy Nancy Gold roots were cut in two and into a hole made in one of the halves with a cork-borer was inserted a plug of flesh removed from a diseased Porto Rico root by a similar cork-borer, every plant growing from the 30 half-roots thus inoculated began to show distinct foliage symptoms within 30 to 40 days. Vein feathering and leaf mottling appeared. No abnormal symptoms showed up on the leaves of the plants from the other uninoculated halves of the Nancy Gold roots. After 50 days the mottling appeared to fade and sometimes purple pigmentation appeared in the form of ring-spots.

Discarding local sweetpotato seedstocks in the fall of 1944, because of the disease, the Experiment Station brought in 60 bushels of new Louisiana Porto Rico sweetpotatoes for seedstock and planted it in 1945 on a farm 2 miles away to prevent the infection from local sources if possible. No foliage symptoms developed during the 1945 season and no internal cork spots appeared in the roots from this planting. Thus there was apparent freedom from the disease in spite of the fact that when corografts from sweetpotatoes grown in 1945 from original Louisiana stock were made onto 30 presumably healthy Nancy Gold roots, plants from two of the latter developed distinct symptoms. That primary infections had taken place in 1945 in the apparently healthy field of Louisiana Porto Rico was indicated by the extensive appearance in the 1946 plantings from this 1945-grown stock of marked foliage and root symptoms.

A survey in ~~central~~ and northeastern South Carolina in 1946 disclosed the presence of typical leaf symptoms in every field of sweetpotatoes visited, whether growing certified seed or not, and in roots from plants showing leaf symptoms corky spots were found in most instances.

Insect transmission experiments to find a possible insect vector of the virus were planned for the spring in 1946 using presumably disease-free Nancy Gold obtained from Kansas. However, in subsequent examinations of varieties from storage at the Edisto Station, Nancy Gold was found to have a very low incidence of cork and was judged, therefore, to be unsuitable for transmission work. Since Porto Rico shows internal cork spots more abundantly than Nancy Hall or Nancy Gold, apparently disease-free stock of this variety was obtained from Ellis in North Carolina and planted on Edisto Station land under cloth cages

into which were later Carolina in the vicinity of the place which the propagating roots had come, complete initial freedom of the stock from the virus could not now be assured and this might seriously affect interpretation of results.

Study of the development of the internal cork symptoms was begun at the Edisto Station in 1946. Porto Rico Selection #4 of the Edisto Station was used. Sprouts from infected stock were planted at different dates from April 4 to June 15 and the roots were harvested from each plot at different times from August 1 to November 1. From each plot when dug ten of the roots were sliced through ten times to observe the amount of cork spotting. The rest from each plot were put into cure and stored through the winter and samples of ten roots each were removed at about monthly intervals up to March 1. These samples were also sliced and in all cases record was made of the number of roots, and number of slices showing the typical internal cork spots and the area of flesh occupied by them. The results were very consistent and showed definitely that as high as 50 percent of the roots from plants set April 4 contained some cork spots at the earliest digging date, August 1. There was gradual increase in the amount of internal spotting in the field but greater increase occurred during storage. The longer the samples were stored the more internal cork developed and this reached greater proportions by March 1 in roots harvested early than in roots harvested later. The average number of spots per root was least at the time of digging. The number increased up to January 1. The area of the spots also increased up to the last date of observation, March 1. The freshly dug roots from the plot that showed 50 percent affected by spotting on August 1, showed 100 percent of the roots visibly affected by October 1. This sequential picture was paralleled rather consistently in all lots from all plots in this series.

A study was made of the relative extent to which roots of different sweetpotato varieties would show the internal cork spot effect. In the spring, roots of all the varieties grown in 1945 at the Edisto Station and stored through the winter were sampled by cutting. There was marked difference in the extent of appearance of internal cork. Among the starch varieties B-2072 showed the most internal cork of all while the high yielding B-4004 had next to the most. At the bottom of the list Triumph, L-81, B-36 and L-5 showed no internal cork. Types that show no internal cork, however, may show distinct leaf symptoms. For example L-61, with no cork found in the roots, showed clearly defined chlorotic spots on the leaves.

Among the table varieties there was likewise a wide range in the degree of internal corking although none in this test approached the extreme amount shown by the worst starch types. The table varieties ranged from fairly high amounts to little or none. Strains of Porto Rico and related selections showed a good deal; Nancy Hall very little. Seven showed no internal cork at all, among them L-7, B-513, B-577, Dessert, and B-219. Musbaum stated that since the samples used were small, not too much reliance should be placed on the comparative ratings shown in this test. J. B. Edmond was reported to have examined 20 roots from each of the sweetpotato lines grown at the Georgia Experiment Station finding, in general, far less cork than Musbaum found at the Edisto Station, with some discrepancy in the relative position of different lines on which records were obtained at both places. Edmond found some spotting in Triumph which Musbaum found free. Edmond found no line in which every root sampled showed internal cork. Attention was called to the need for following up this study with further observations on larger samples of the different varieties at different locations where the infection is present. No variety had been found so far which did not show some leaf symptoms even though no root symptoms were observed.

Attention was called to the difference between the blackish to dark brown internal cork spots and the lighter brown spots with pearly centers sometimes found deep in the flesh of sweetpotato roots invaded by root knot nematodes, each pearly center being an egg-filled eelworm cyst.

Discussing the leaf symptoms on the Porto Rico variety, Musbaum said that about 8 weeks after planting the leaves begin to show faint light-green mottling or spotting. There is sometimes a splotching associated with leaf veins. About 2 weeks later anthocyanin is generally formed in the leaf areas around these spots resulting in reddish or purplish rings. After another two or three weeks the color seems to spread out in an irregular blotchy manner with loss of the ring-like appearance followed by a gradual fading out. At no time is there any necrosis of the tissues. In the end, affected leaves that once showed conspicuous mottling and ring-spotting cannot be easily distinguished, if at all, from senescent healthy leaves.

Temperature, soil fertility, rainfall, etc. cause changes in the expression of ring-spot symptoms. The cool spell in August 1946 brought them out sharply. In hot weather the ring-spots may not form at all. In highly fertile soil with plenty of moisture the symptoms may be delayed. If the plants are unthrifty and retarded, the spots tend to show up more clearly. Dry, hot weather tends to mask the foliage symptoms, it was said.

Discussing the relation of the leaf symptoms to the internal cork effects, Musbaum called attention to the fact that irrefutable scientific

Nusbaum stated , by fertilizing the plant bed. Effects of the disease on yields, however, could not be determined with assurance until sufficiently large stocks of known disease-free roots were obtained and grown under comparable conditions with known infected stock of the same variety. Thus far, however, there seemed to be no evidence that field production has declined in South Carolina where the disease had appeared. The chief damage done by the disease would probably be chargeable to the objection consumers and dealers would most certainly raise if they should encounter any considerable amount of the internal cork in sweetpotatoes from any particular section. This would be certain to ruin the demand on the larger markets in the course of time. Although the surrounding flesh of the sweetpotato does not seem to be affected in taste or consistency, the internal cork spots themselves are hard, gritty and unpleasant in the mouth even though they do not have a very marked unpleasant flavor. The spots are also scattered irregularly through the flesh, as much at one end as the other, and would be difficult or impossible for the cook to find and get rid of entirely. Canneries would undoubtedly find the disease troublesome. T. A. Cole indicated that no word of unfavorable market reaction had come so far. In his opinion, however, the disease creates one of the most important problems South Carolina sweetpotato growers will have to face on national markets if it gets any worse. An eventual repercussion would be bound to come on the market in such case.

Nusbaum mentioned that some of the symptoms like malformation and stippling on young sprouts suspected at first of connection with internal cork had not been found consistently present and further study is needed to determine whether or not they may be due to other causes.

Local sources of infection other than sweetpotatoes were mentioned as a possibility but no symptoms had yet been observed on either annual or perennial morningglory (bindweed), relatives of sweetpotato common in the State. As for possible carries of the disease, Nusbaum indicated that leafhoppers were suspected although no experimental proof was yet available. Insect transmission was, however, considered possible, in fact, probable in view of the way the disease seems to spread in the field to healthy stocks as in the case of the Louisiana Porto Rico stock already referred to. It was hoped that the experiments then running at the Edisto Station would throw light on this question.

Experiences From Other States

North Carolina

Ellis reported on a two day trip taken during the summer of 1946 starting at McCuller's Station not far from Raleigh and driving down through the Coastal Plain Branch Station at Willard and on to the South Carolina line, leaf symptoms were found everywhere and apparently root symptoms were found on sweetpotatoes grown at McCuller's station and stored from the 1945 crop.

Virginia

Ferne and Cook reported that no survey had been made and that no evidence of the disease had yet come to their attention.

Maryland

Jehle said that he did not believe that there was any of the internal cork in commercial sweetpotatoes in Maryland although he had seen a mosaic similar to tobacco mosaic. No complaints of troubles such as internal cork had been received from storage houses in Maryland. (Nusbaum interjected that he had visited the Lake City Packing Company, Lake City, S. C., where the manager definitely stated that he had never seen any internal cork. On request he brought out some old sweetpotatoes, cut them open and revealed the worst internal cork condition Nusbaum had seen. The manager explained that he had laid this condition to wire worm trouble.) Whether Jersey and Maryland Golden, the variety commonly grown in Maryland, would show internal cork symptoms Nusbaum would not say since they were not included in his tests.

Some lines of sweetpotatoes included in experimental work at the U. S. Plant Industry Research Station, Beltsville, were reported to have shown unmistakable symptoms of internal cork.

Georgia

Miller reported that internal cork was widespread in spots in different parts of Georgia. In some lots perhaps 50% of the potatoes would show internal cork but in most cases it was difficult to detect without cutting, though in bad cases the surface may be depressed. No internal cork was found in unit No. 1 Porto Rico sweetpotatoes grown by a Mr. Green at Toccoa, Georgia, from stock obtained several years ago from Clemson, S. C. This was suggested as a local area from which to obtain disease-free stock. In southeastern Georgia, Mr. Harrison was growing sweetpotatoes for seed and no internal cork was found in this stock. It had been obtained six years previously from Rast in South Carolina. Harrison had distributed propagating roots to growers extensively and it had kept free from the disease but farmers who had recently got roots from Rast and from Alabama had found internal cork present. Some stock originated in Florida was found free from internal cork. Sometimes, Miller stated, where new and

old stock would be grown on the same farm, the old stock would be free from internal cork while recently obtained stock might have it. Barss interjected that in addition to vegetative propagation, the rate of the spread of the disease might depend on the natural distribution and abundance of an insect vector.

Hughes stated that he had set out at the Edisto Station 1200 seedlings grown from true seed produced in the greenhouse in 1946. About 1/2 of these were already showing leaf symptoms on Sept. 12. Nusbaum added that vine cuttings from disease-free stock picked up the virus the first season they were planted out.

Mississippi

Bain reported that Presley picked up at the dehydration plant at Laurel roots that looked as though affected with internal cork. Grown in the greenhouse, they showed no typical symptoms although some odd appearances showed up on plants from apparently both diseased and disease-free sweetpotatoes. No surveys had been made in Mississippi and no symptoms like typical ring spot had been observed on foliage in casual observations.

Louisiana

No representative was present from that State. Nusbaum reported that although the seed stock obtained by him from Louisiana in 1944 was disease-free, the actual situation in that State was not known.

Tennessee

Sherbakoff reported that the disease was recognized for the first time in the fall of 1945 from material grown at the Jackson Station. None of the disease was found in sweetpotato stocks at Knoxville. A check-up at the Jackson station during the winter showed that none of the stocks in storage were free from internal cork. The minimum percent was about 15, the maximum present was about 40. Examination of storages in the vicinity of Jackson by cutting revealed no internal cork. The disease appears to have been confined to the sweetpotatoes grown on the Jackson station farm. It was therefore decided to destroy the station stocks completely in order to avoid the danger of spread to farms.

Certification Problems Created by Internal Cork

The question was raised by Haskell as to what should be done about certification of sweetpotatoes effected with internal cork. Nusbaum reported that he had advised Mr. Berly, in charge of sweetpotato certification in South Carolina, that in his opinion, in view of the absence of known disease-free stocks in the State it would seem advisable to certify affected stock but not to permit out-of-state shipment. Armstrong, of the Experiment Station at Clemson, indicated that he was in doubt as to what should be done.

Sherbakoff stated that discussion of the matter in Tennessee had brought out the uselessness of establishing any tolerance for such a disease as internal cork when there is plenty of clean stock available. It was his opinion that all States should stop the certification of sweetpotatoes with any trace of the disease. Any certification, he stated, implies good stock. He said that it was proposed in Tennessee to quit the certification of all affected stock and also to prevent the movement of all sweetpotato stock from county to county until the situation regarding the occurrence of the disease in the State is known. Sherbakoff called attention to the fact that in many states of the South there is likely to be some growers still with no disease in their sweetpotato stocks. If any internal cork is allowed in the certified stock of any state and such growers buy it they will be in real trouble.

Miller stated that in Georgia no grower is permitted to seed used stock without certification. Bain said that the same is true in Mississippi. It was generally admitted that the disease presents a difficult problem.

Haskell asked what inspections would be needed to ascertain freedom from internal cork in any seed stock. Nusbaum stated that the most important inspection would be at the end of the storage season when the roots show the internal condition most clearly. A field inspection would probably be desirable also but in view of the effect of climatic conditions or masking of symptoms, field inspection would have limitations. Inspection of roots at harvest would be unsatisfactory since low percentages of disease at that stage might readily escape notice in cutting a few samples. It was generally agreed that the disease could be detected best by an inspection in the bank or in the storage house. Bain reported that in Mississippi inspectors make a storage house inspection, a bed inspection, and a field inspection. Nusbaum felt that plant bed inspection would be of no value, as far as internal cork goes, unless the bedded roots were examined by cutting.

In reply to a question as to what size of sample an inspector should take and how many cuts he should make to detect internal cork, Nusbaum said that it would be hard to lay down definite rules. More experiments would be necessary as a basis for judgment. It was his tentative opinion that after three months of storage it would perhaps be sufficient to take 10 potatoes out of every 10 baskets taken at random. He believed that it would be sufficient to cut 100 roots taken in this way before deciding that a given stock is free from the disease. He pointed out, however, that the question of the effect of different temperature levels on the development of internal cork in storage should be investigated.

Haskell summarized the situation by recalling that in view of the discussion it looked as though each state would have to follow its own

judgment in adjusting its certification of sweetpotatoes to the situation created by this disease. We called attention to the fact that the International Crop Improvement Association recognizes in general three classes of seed stock. First, foundation stock grown under special regulations involving protection against the introduction of disease. Secondly, registered stock produced by growing foundation stock under certain conditions and, finally certified stock grown from registered stock in such a way as to meet specific requirements. Haskell stated that it may be necessary to set up standards for foundation stocks of sweetpotatoes involving freedom of any trace of internal cork.

Visit to Field Plots

After a lunch at Williston a visit was made to the sweetpotato plots on the Edisto Station farm where the characteristic foliage symptoms were in evidence, in different stages of development, on sweetpotato plots which had been planted at different times. Excellent opportunity was afforded the visitors to become acquainted with the symptoms and to benefit by the explanation provided on the spot by the investigator of the disease. A long line of cloth cages devoted to current insect transmission was also observed.

Relation of Extension Work to the Disease

In discussing what Extension workers might do, Nettles indicated he believed that not too much publicity should be given to internal cork as yet, in view of the lack of information as to the extent of the disease and the possibilities of control. Fenne asked why the disease should not be talked about? What would be gained by keeping the information we have away from growers at this time? Nusbaum stated that he had talked to a number of commercial growers who appeared much interested in as much as they had not seen the disease before. Nusbaum, was able to demonstrate for them its characteristic effects.

Cole thought it well to talk with growers but avoid newspaper publicity. Growers ought to know the situation, in his opinion, in regard to a problem like this so as to back up research and extension agencies in their attack on it. Cook asked if it wouldn't be well to have some information to give to the grower on what to do about the disease before there is much talk about it. He thought a big step forward had been made in this direction by bringing together so many specialists to consider all angles at this time. Nettles reiterated his belief that Extension people should know what growers can do in this situation. Bain asked if farmers were not entitled to facts including the fact that not much is known about this disease and how to control it.

Cole then suggested, in light of the facts now available about the increase of internal cork lesions during storage, that farmers can be told to market their infected stock as early as possible in order, as far as may be, to prevent its going on to the market in a condition which would have unfavorable effect for both grower and dealer. This suggestion received general approval of the group as one positive recommendation that could now be made.

Sherbakoff followed with a suggestion that if a grower has the disease in his stock, the extension pathologist can wisely advise him to try to obtain seedstock from some locality, perhaps outside his own state, where there is good evidence that the disease is not present. This seemed to the group another positive recommendation that can well be made.

Nusbaum called attention to the apparent evidence from his experiments that if seedstock could be obtained from a disease-free source a crop could be grown the first season which would have no internal cork spots in the roots. It could not be grown the second season, however, in a location where the disease exists without danger of the diseased rootcondition becoming manifest. As far as South Carolina is concerned, there is apparently no place in the state where disease-free sweetpotato seedstocks can be grown far enough away from infected stock to be safe from disease invasion. The distance from one sweetpotato patch to another rarely exceeds half a mile. Therefore he thought farmers in South Carolina would be obliged to go outside the state regularly for their disease-free stock if such is possible. The only way by which South Carolina sweetpotato growers will be able to compete with other states for Northern Markets after the markets become wary of this disease is by growing tablestock from imported disease-free stock somewhat the way many Southern areas devoted to growing Irish potatoes depend on Northern states for their seedstock. There might be good disease-free sources of sweetpotato seed in Georgia or Tennessee or other near by states. Sources of good sweetpotato seedstocks have always been a problem in South Carolina. The internal cork disease situation makes this worse.

Bowers felt hesitant about encouraging too much publicity until there was some method of control to recommend. Garriss was of the opinion that before going ahead in North Carolina, a survey to determine how widespread the disease is in the state should be carried out. Andes thought it better to give out the available facts rather than let incorrect rumors get started. Fenne indicated that it would not be possible to do much in Virginia until the distribution of the disease in the state is learned, except that it **would** be possible to warn growers against getting seedstocks from areas where the disease is known to exist.

Haskell considered that ~~two~~ good recommendations had emerged from the discussion:

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- (1) To send early to market crops from sweetpotato fields with any infection present.
- (2) To use seedstocks free from the internal cork disease.

Bain stated that diseases involved are specified in connection with sweetpotato certification in Mississippi. Jehle indicated that in Maryland a field entered for certification can be rejected by an inspector for any condition deemed by him inimical to the crop. Nusbaum felt that if he were a farmer wanting to get clean planting stock he would rather get it from a region or area where the disease had never been found than to get apparently disease-free stock grown on a farm in a locality where the disease is present in nearby fields.

Action by the Conference

Plant Disease Reporter Supplement. At the suggestion of Miller, it was voted to request the Plant Disease Reporter to summarize progress in knowledge of the internal cork disease of sweetpotatoes and its distribution, perhaps in a special supplement contributed to by those at the conference and other interested workers.

More Funds and More Work. Cole suggested that an effort be made to get more funds to intensify the work on this disease and give the investigators in charge of such work extra help. Nusbaum called attention to the fact that Edmond had suggested in a circular sent out to collaborators in the cooperative sweetpotato research group in the South that the internal cork disease be brought into the picture in their program. Bain indicated that this was probably desirable, mentioning, however, that Edmond had left the group of collaborators but was still interested.

Cooperation of Southern Experiment Station Directors. McGinty stated that the directors of experiment stations of the Southern States would meet in Birmingham, Alabama, September 16, to discuss possible lines of cooperative regional research under the new Agricultural Research and Marketing Act (Flannagan-Hope Act) for which the next Congress is expected to appropriate funds. Part of these funds will be available to the states only for approved cooperatives research with emphasis on problems of regional rather than local importance. He asked whether those present thought the internal cork disease problem one of regional importance and worthy of consideration by the Southern directors? Miller stated that sweetpotatoes constitute one of the most important of all food sources throughout the Southern region. Hence the internal cork problem must be considered of regional importance. Rogers stated that sweetpotatoes stand next to the top among vegetable crops in America. Barss felt that this appeared to be a type of problem needing coordinated regional attack. McGinty stated that a new problem like this would have to compete for attention with old-line established projects. It was voted unanimously that the internal cork disease of sweetpotato, in the opinion of the group,

is an important regional problem for the entire group of Southern states and that Vice Director McGinty be requested to present the problem to the Southern experiment station directors meeting at Birmingham for their consideration.

Proposed Cooperative Regional Research Project. McGinty said he would like to see a subcommittee of the group prepare a specific regional research project on internal cork disease of sweetpotato in regular project form, setting forth the desirable research objectives, the procedures required to achieve these, and outlining plans for participation in the research by the different states and the U.S.D.A. in such a way as to permit most rapid progress and avoid unnecessary duplication of work or equipment. It would seem that those who would direct research in each state under such a regional project should constitute a working committee to meet from time to time to review the situation and develop more detailed plans and procedures for the cooperative work ahead. Such a project as this would require not only plant pathologists but entomologists and plant breeders as well. Not all states in the region might wish to participate. The suggested project outline would go to the group of Southern Experiment Station Directors for consideration and if approved would be transmitted to the 9-man committee, representing the directors of the state agricultural experiment stations, which must recommend such a project before the Secretary of Agriculture or his authorized representative can approve the expenditure of funds for it under the Agricultural Research and Marketing Act.

Nusbaum called attention to a fund of a quarter of a million dollars set aside by the General Electric Company for research on the role of electronics in agriculture which Elmer of Kansas had brought to his notice. This led to the thought that perhaps the General Electric Company might be interested in supporting from this fund research to determine whether electronics might in some way be used to detect the presence of the internal cork virus or internal cork lesions in stocks of sweetpotatoes to permit their discard.

Preparatory Committee of Three. After some discussion as to the best way to get going, it was unanimously voted to appoint a preparatory committee of three to draft a general outline for the proposed regional research project on the internal cork disease of sweetpotatoes and to learn from the different states and from the U. S. Department of Agriculture what participation might be expected. It was suggested that USDA relationships might be developed through contact with Magness, Boswell, Steinbauer, and Doolittle. The following were elected:

J. H. Miller, Georgia
D. D. Ellis, North Carolina
C. J. Nusbaum, South Carolina, Chairman

It was agreed that each of the three committee members should prepare a preliminary project outline, all three outlines to be exchanged and studied before the preparatory committee should meet to work out the final form. McGinty emphasized the fact that it would not pay to be niggardly in arranging for necessary conferences.

Possible February Meeting of Prospective Collaborators. While the time for the next meeting of collaborators on the proposed Sweetpotato Internal Cork regional project was left to the Preparatory Committee of three, the meeting of the Association of Southern Agricultural Workers planned for next February in Gulfport, Mississippi, was mentioned as possibly a suitable occasion for the next meeting of the group concerned with the internal cork problem.

Need for Immediate Survey. Nusbaum called attention to the need for prompt survey of all sweetpotato growing areas to get more complete information on the present extent of the internal cork disease. It was pointed out that Federal and state inspectors, for instance, can help. So can agronomists, entomologists, horticulturists, and others who can travel and observe. Nusbaum offered to provide Kodachrome slides showing typical symptoms. It was agreed that all reports of occurrence of the disease in any of the states should be sent in promptly to C. J. Nusbaum, Edisto Experiment Station, Blackville, S. C. He agreed to summarize and mimeograph the information for general distribution. The recording of localities or areas surveyed and found free of all signs of the disease was held to be important. It was also emphasized that in areas, as in Georgia, where survey of storages last winter or spring showed no evidence of internal cork, field surveys should be made this season to determine if the growing vines show any foliage symptoms.

Insect Vectors. Watts reported that help of entomologists in other locations was needed to supplement the investigations at the Edisto Station to determine as soon as possible what the facts are as to possible insect vectors of the virus and what methods of dealing with them can be worked out. It was held desirable to report about the disease to the Southern entomologists and enlist their cooperation. Perhaps, Watts suggested, it might be possible to work out control measures that would hold down all insect pests of sweetpotatoes at the same time. At the Edisto Station tortoise beetles constituted at least 65 per cent of the insects found in sweetpotato plantings, flea beetles about 10-15 percent, leafhoppers about 10 percent and aphids about 1 percent. During August a number of other insects were noted as accidental visitors such as whiteflies, lacebugs, larvae of diptera, etc. Thrips failed to survive or reproduce on sweetpotatoes.

Report of Conference. Barss was asked to prepare from his notes a report for mimeographing and distribution to those interested, including plant pathologists in Southern states not represented at the meeting.

This he consented to do with the help of Nusbaum and Haskell to detect errors or omissions. It was suggested that a short summary of the report be prepared for the Plant Disease Reporter. Adjourned at 5:20 p.m.

Available References

Nusbaum, C. J. A preliminary report on internal cork, a probable virus disease of sweetpotato. Plant Disease Reporter 29 (25/26):677-678, Sept. 15/Oct. 15, 1945.

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_____ Internal brown spot, a boron deficiency disease of sweetpotato. Phytopathology 36(2): 164-167, Feb. 1946

Miller, J. H. Sweet potato internal cork in Georgia, Plant Disease Reporter 30:213, processed. June 15, 1946

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